Supplemental Results:

Survival Analysis

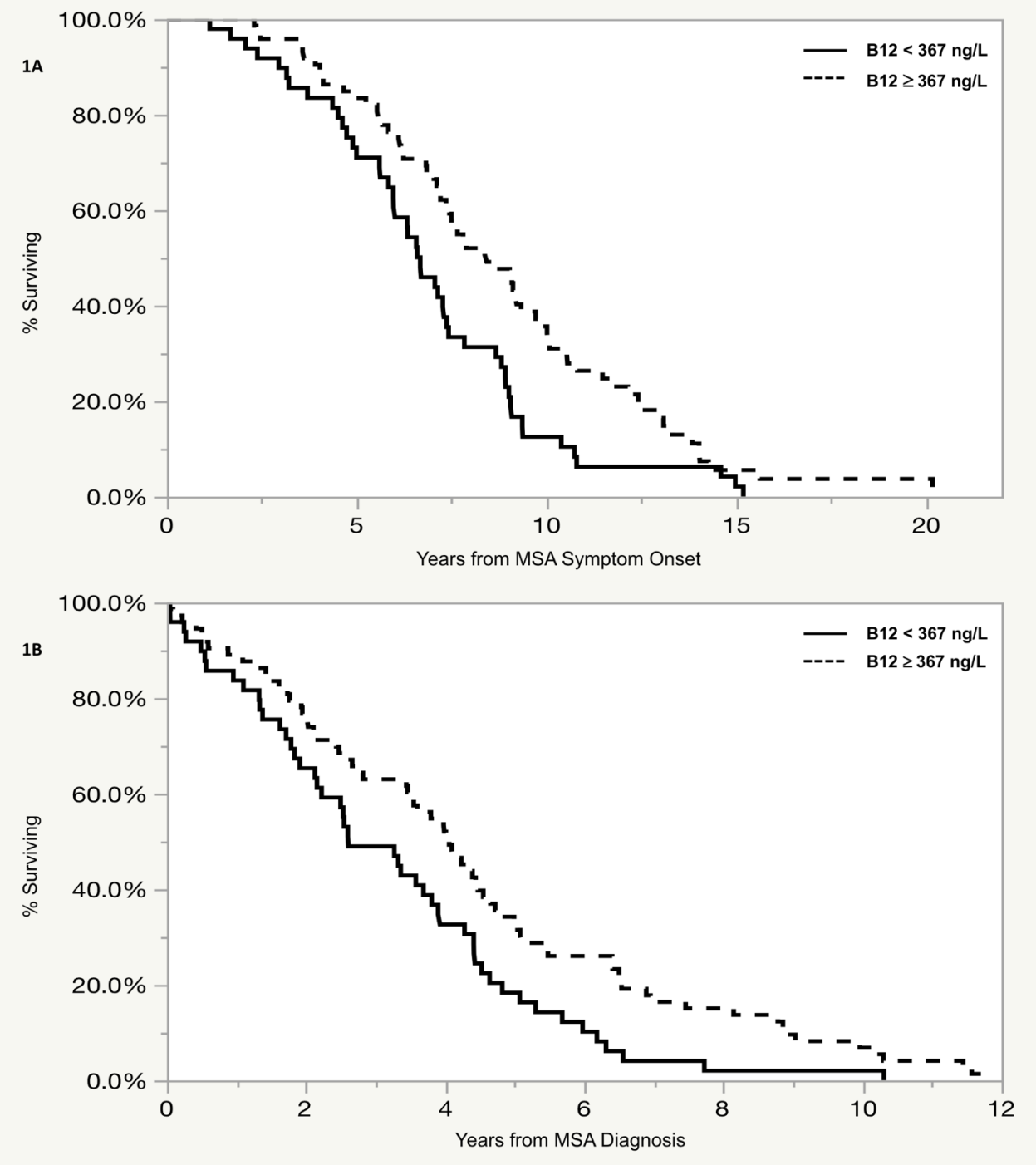
Although we controlled for multivitamin use in our model, we also compared survival in those patients not taking a multivitamin at B12 level assessment (n=122) utilizing the cutoff of 367 ng/L. In this analysis, median survival from symptom onset was 7.4 years (IQR 6.8-8.7). Median survival from symptom onset in those with vitamin B12 <367 ng/L was 6.7 years (IQR 5.8-7.4) compared with 8.4years (IQR 6.8-9.3) in MSA patients with a vitamin B12 level ≥367 ng/L (**Supplemental Figure 1A).** Predictors of shorter survival included falls within 3 years of diagnosis (HR 2.9, 95% CI 1.8-4.7) and vitamin B12 <367 (HR 1.6, 95% CI 1.0-2.5). Utilizing vitamin B12 as a continuous variable, each 100 ng/L increase in vitamin B12 was associated with a HR of 0.91 (95% CI 0.85-0.97). Falls within 3 years (HR 3.0 95% CI 1.9-4.9) were also associated with poor survival in this model.

In those from time of MSA diagnosis in patients with vitamin B12 <367 ng/L was 2.6 years (IQR 2.1-3.8 years) compared with median survival from time of diagnosis of 4.1 years (IQR 3.4-4.5years) in patients with vitamin B12 ≥ 367 ng/L (**Supplemental Figure 1B**). Predictors of shorter survival in this model included vitamin B12 <67 ng/L (HR 1.90 95% CI 1.2-2.9) and falls within 3 years of diagnosis (HR 1.7, 95% CI 1.1-2.7). Utilizing vitamin B12 as a continuous variable, each 100 ng/L increase in vitamin B12 was associated with a HR of 0.93 (95% CI 0.86-0.99). Orthostatic intolerance (HR 1.6, 95% CI 1.0-2.5) and falls within 3 years (HR 1.9, 95% CI 1.2-2.9), were also significant predictors of shorter survival in this model.

Utilizing individual vitamin B12 tertiles, predictors of shorter survival from MSA symptom onset included vitamin B12 <367 ng/L (HR 1.5, 95% CI 1.0-2.3), vitamin B12 367-542 ng/L (HR 1.6 95% CI 1.0-2.4) falls within 3 years (HR 2.6 95% CI 1.8-3.8) and MSA-P subtype (HR 1.6 95% CI 1.1-2.3) (**Supplemental Figure 2A**).

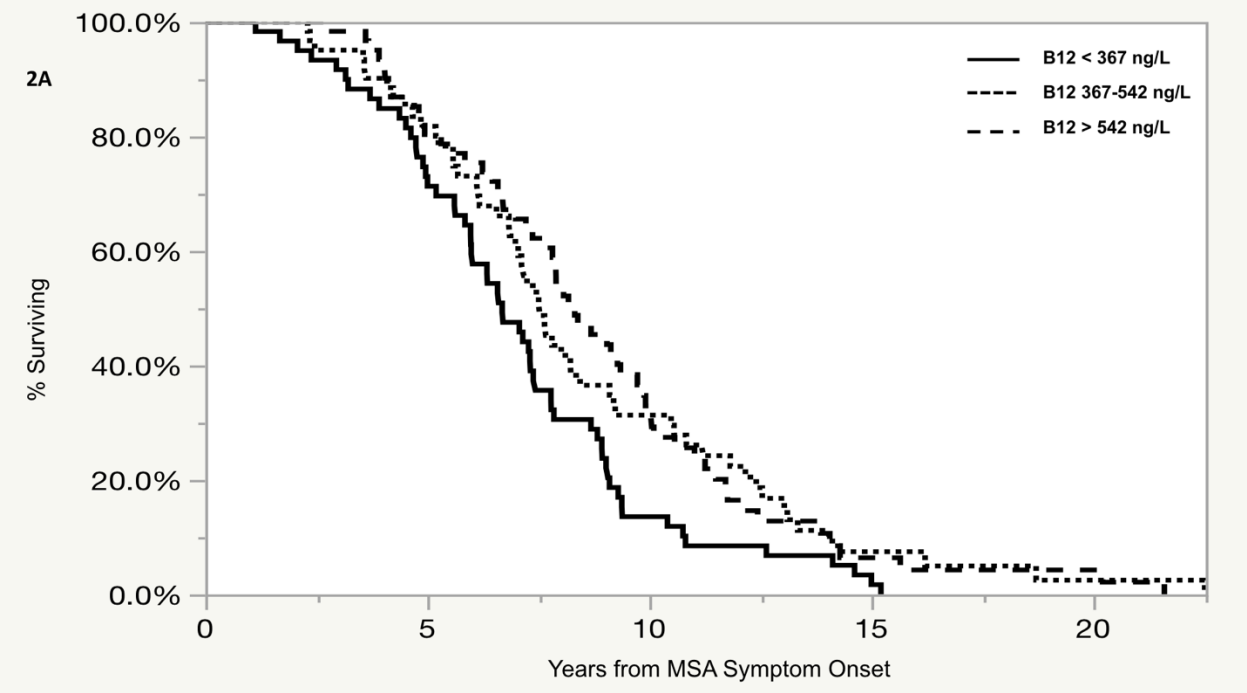
Predictors of shorter survival from MSA diagnosis in our predefined model utilizing individual B12 tertiles included vitamin B12 <367 ng/L (HR 1.9, 95% CI 1.2-2.8), vitamin B12 level 367-542 ng/L (HR 1.8, 95% CI 1.2-2.8), falls within 3 years of MSA diagnosis (HR 1.6, 95% CI 1.1-2.2) bladder symptoms (HR 1.6, 95% CI 1.0-2.6), urinary catheter requirement (HR 1.7 95% CI 1.0-2.8) male sex (HR 1.4 95% CI 1.0-2.0) and MSA-P subtype (HR 1.5 95% CI 1.0-2.0) (**Supplemental Figure 2B**).

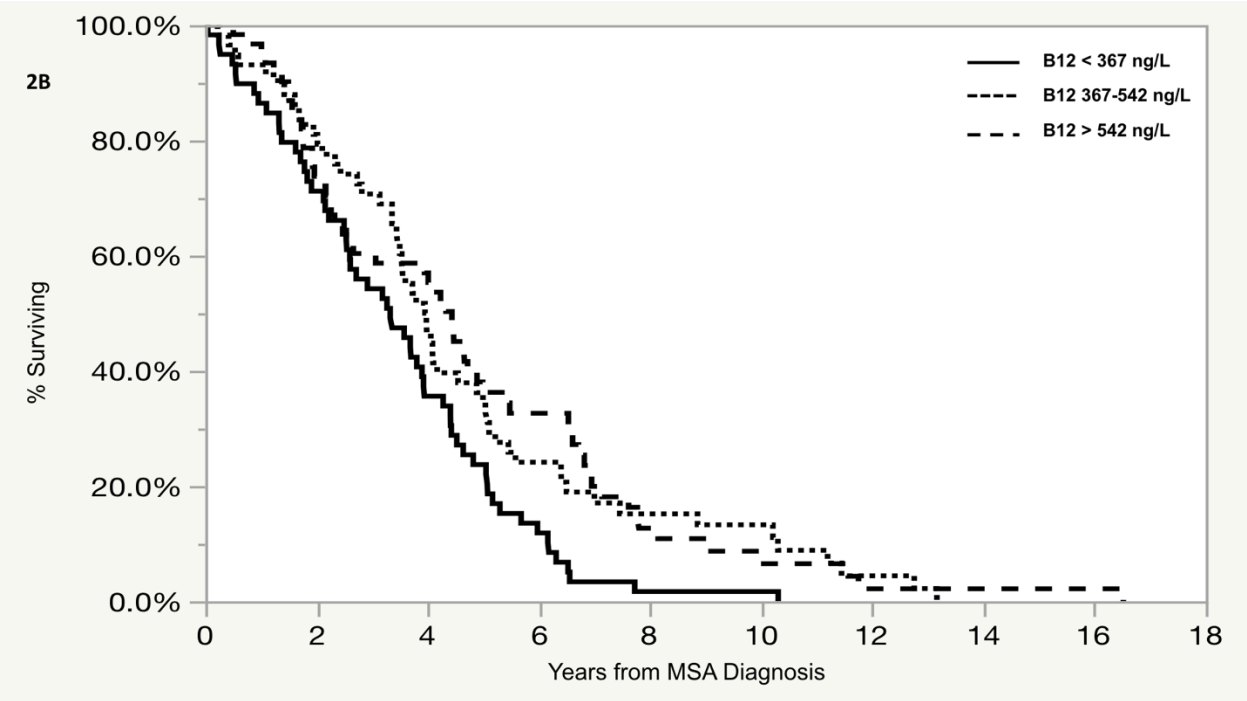
Supplemental Figure 1: Survival From MSA Symptom Onset (1A) and MSA Diagnosis (1B) by Vitamin B12 Status in Patients Not Taking Multivitamins (n=122 patients)



Ng/L=nanograms per liter

Supplemental Figure 2: Survival From MSA Symptom Onset (2A) and MSA Diagnosis (2B) by Vitamin B12 Tertiles





Ng/L=nanograms per liter